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REMARKS

Claims 1-7 are pending and have been rejected. Claims 1 has been amended to incorporate the recitation of claim 2 that the indium tin oxide has a tin oxide content of 4 to 6%. Claim 6 has been similarly amended to incorporate the recitation of claim 7. Claims 2 and 7 have been canceled. Claims 1, and 3-6 remain in the case.

Claims 1-7 are rejected under Section 103(a) based on U.S. 5,009,922 ("Harano") in view of U.S. 6,262,441 ("Bohler"). The examiner states that "Harano discloses that the vapor deposition material 3 (sintered indium oxide containing 7 wt.% tin) is evaporated and the evaporated particles deposit on the substrate 6 thus forming an ITO film on the glass substrate." Additionally, the examiner asserts that the teaching on Harano of increasing gas pressure during deposition in order to reduce compressive stress "results in desired reduced surface roughness." Bohler is added as teaching that ITO films that have a work function of 4.9 eV.

At the outset, applicants note that there is no disclosure in Harano that increasing gas pressure during deposition in order to reduce compressive stress also "results in desired reduced surface roughness." Thus, there is no basis for the examiner's allegation that the process of Harano will produce a film as presently claimed.

While no *prima facie* case of obviousness exists, in order to advance prosecution applicants have amended claims 1 and 6 to recite a range of tin of 4 to 6 wt%. These recitations already were presented in claims 2 and 7, but the examiner has not explained why it would have been obvious, based on the combination on references, to control the percentage of tin in the mixture of tin oxide and indium oxide of the material to be vaporized to a value of 4 to 6%. The tin oxide content influences both the specific resistance and the work function. This is neither disclosed nor suggested in Harano.

Harano discloses that:

> As the material 3 to be evaporated to obtain a transparent conductive film, a sintered product of tin-containing indium

> oxide, antimony-containing tin oxide, aluminum-containing zinc oxide or the like is usable. Among these, a sintered product of indium oxide containing 0-10 wt % of tin is most preferable because a transparent conductive film having the lowest resistivity can be obtained.

All of the examples of Harano disclose "As a material to be evaporated, a sintered product of indium oxide containing 7.5 wt% of tin was used. Thus, while Harano broadly discloses a range of tin content that encompasses the amount now recited in claims 1 and 6, the sole example at 7.5 wt% directs a skilled artisan ***away*** from the presently recited range. Harano does not teach that tin content is a result-effective variable. Applicants, on the other hand, have discovered that tin content ***is*** a result effective variable, and disclose on page 13 that:

> If the ratio of SnO_2/ITO is smaller than 4 wt.%, although the work function is then increased, the resulting specific resistance exceeds $1.6 \times 10^{-4}\ \Omega \cdot cm$, which results in increased power consumption and degraded display quality. On the other hand, also if the ratio of SnO_2/ITO is larger than 6 wt.%, the resulting specific resistance exceeds the above $1.6 \times 10^{-4}\ \Omega \cdot cm$. Furthermore, in this case the work function is also lowered, and hence the energy barrier between the ITO film 2 and the hole transport layer 5 is increased to increase the driving voltage as well.

Results in the specification clearly show that an ion-plated ITO film formed from a contact that comprises from 4 to 6 wt% of SnO_2 as presently claimed in claim 1 are patentably distinct from ITO films formed from compacts outside this range. Thus, the top of page 17 describes the formation of films using compacts using 3 wt% and 10 wt% under the same discharge conditions. The results are shown in Table 1. For these films, one or more of the work function, surface roughness, and specific resistance were outside the presently claimed ranges for these variables. In addition, the energy barrier and driving voltage were unacceptable for test pieces made from films in which SnO_2 content was 10 wt%.

The combination of the ion plating method and control of tin oxide content influences three variables: specific resistance, work function and surface roughness. By using ion plating

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and controlling tin oxide content as presently claimed, all three of these variables can be optimized to desired values. This is not suggested in the art cited by the examiner.

Based on the foregoing, it is submitted that the claims in this case are allowable, and prompt receipt of a notice of allowance is solicited. Should there be any matter requiring further attention, the examiner is invited to contact the undersigned at the telephone exchange provided below.

Respectfully submitted,

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VERSION WITH MARKINGS TO SHOW CHANGES MADE

Please cancel claim 2 and 7, and amend claims 1 and 6 as follows:

1. (Twice Amended) A substrate with a transparent conductive film, comprising a transparent substrate, and a transparent conductive film formed on a surface of said transparent substrate, wherein said transparent conductive film has a work function of 4.9 to 5.5 eV, a surface roughness of 1 to 10 nm, and a specific resistance of 1.6 x 10^{-4} Ω·cm or less,

wherein said transparent conductive film is formed on the surface of said transparent substrate by an ion plating method by using indium tin oxide which is a mixture of tin oxide and indium oxide as a material to be vaporized, wherein said indium tin oxide has a tin oxide content of 4 to 6%.

6. (Twice Amended) A method of producing a substrate with a transparent conductive film, comprising:

providing a transparent substrate; and

ion plating a transparent conductive film on a surface of said transparent substrate by using indium tin oxide which is a mixture of tin oxide and indium oxide as a material to be vaporized, wherein said indium tin oxide has a tin oxide content of 4 to 6%,

wherein the transparent conductive film has a work function of 4.9 to 5.5 eV, a surface roughness of 1 to 10 nm and a specific resistance of 1.6 x 10^{-4} A · cm or less.